Claim Listing

1–32. (canceled)

33. (new) A method of forming a multi-layer web in a formation section, comprising the steps of:

forming a first partial web on a first wire of a first wire unit with a first pulp suspension jet supplied by a first headbox at a forward end of the first wire unit;

guiding the first wire of the first wire unit and the first partial web formed thereon through a second wire unit, successive to the first wire unit, so that the first wire of the first wire unit meets a second wire of the second wire unit and defines a two-wire stretch with the second wire in the second wire unit, the two-wire stretch defining a forward end of the two wire stretch where the first wire meets the second wire, and a first side defined by the first wire and a second side defined by the second wire;

forming a second pulp layer atop the first partial web with a second pulp suspension jet supplied by a second headbox, at a forward end of the second wire unit;

performing non-pulsating dewatering of the second pulp layer atop the first partial web in at least a first dewatering zone of the two-wire stretch of the second wire unit, with a fixed first formation shoe having a leading edge and a curved cap, which shoe is located at the forward end of the two-wire stretch, wherein the non-pulsating dewatering takes place by moving the twin wire stretch and the first partial web with the second pulp layer, over the curved cap which is, placed against the second side of two-wire stretch, wherein the first partial web with the pulp layer undergoes non-pulsating dewatering in the first dewatering zone by drawing water from the first partial web with the second pulp layer through openings in the cap formed by holes or by gaps essentially in the lengthwise direction of the machine which extend through the cap, and

effecting the dewatering of the first partial web with second pulp layer with an under-pressure through the openings of the cap in an area following after the leading edge of the first fixed formation shoe;

performing pulsating dewatering of the first partial web with the second pulp layer in a second and downstream dewatering zone in the two-wire stretch of the second wire unit with fixed dewatering lists which are placed against the first side or the second side of the two-wire stretch, the fixed lists extending in the cross machine direction and between which there are gaps which extend in a cross machine direction, through which gaps under-pressure is drawn whereby the first partial web with the second pulp layer traveling in-between the wires of the two-wire stretch is subjected to pulsating dewatering by the fixed dewatering lists, and by under-pressure in the gaps of the fixed dewatering lists.

34. (new) The method of claim 33 wherein the step of performing pulsating dewatering of the first partial web with the second pulp layer in the second and downstream dewatering zone includes controllably loading a plurality of moveable lists against the first side or the second side of the two wire stretch opposite the fixed dewatering lists, at the gaps between the fixed dewatering lists.

35. (new) The method of claim 33 wherein the step of forming the first partial web on the first wire with the first pulp suspension jet comprises forming the first partial web on a fourdrinier wire of a fourdrinier wire unit.

36. (new) The method of claim 35, wherein the first pulp suspension jet directs fiber pulp on the the fourdrinier wire and further comprising dewatering the fiber pulp on the fourdrinier wire in a first fourdrinier dewatering zone and a second, successive fourdrinier dewatering zone.

37. (new) The method of claim 36, wherein the step of dewatering in the first fourdrinier dewatering zone is accomplished as non-pulsating dewatering with a fixed fourdrinier formation shoe having a leading edge and a curved cap, which shoe is located at an impact point formed by the first pulp suspension jet with the fourdrinier wire, wherein the non-pulsating dewatering takes place by moving the fourdrinier wire over the curved cap which is placed against an inner surface of the fourdrinier wire, and wherein the nonpulsating dewatering of the fiber pulp takes place in the first dewatering zone by drawing water from the fiber pulp through openings in the cap which extend through the cap, and affecting the dewatering of the fiber pulp with an under-pressure affected through the openings of the cap in an area following after the leading edge.

38. (new) The method of claim 37, wherein the step of dewatering in the second fourdrinier dewatering zone is accomplished as non-pulsating dewatering with a further fixed fourdrinier formation shoe having a leading edge and a curved cap, which further shoe is located at a impact point formed by the second pulp suspension jet with the fourdrinier wire, and wherein the non-pulsating dewatering takes place by moving the fourdrinier wire over the curved cap which is placed against the inner surface of the fourdrinier wire, and wherein fiber pulp discharged by the second pulp jet is non-pulsatingly dewatered in the first dewatering zone by drawing water from the fiber pulp through openings in the cap which extend through the cap, and affecting the dewatering of the fiber pulp with an under-pressure effected through the openings of the cap in an area following after the leading edge.

39. (new) The method of claim 33 wherein the step of forming the first partial web on the first wire with the pulp suspension jet comprises supplying the fiber pulp from the first pulp suspension jet in to a jaw at a forward end of the first wire unit, the jaw being defined by the first wire and a superpositioned wire defining a first two-wire stretch, the first two-wire stretch defining a beginning where the first wire and the superpositioned wire first meet.

40. (new) The method of claim 39 further comprising dewatering the fiber pulp on the first two-wire stretch in a first non-pulsating dewatering zone and a second, successive pulsating dewatering zone of the first wire unit.

41. (new) The method of claim 40, wherein the step of dewatering in the first dewatering zone of the first wire unit is accomplished as non-pulsating dewatering with a fixed formation shoe having a leading edge and a curved cap, which shoe is located at the beginning of the first two-wire stretch, wherein the non-pulsating dewatering takes place by moving the first two-wire stretch over the curved cap which is placed against one side of the first two-wire stretch, wherein the fiber pulp traveling in between the wires of the first two-wire stretch is non-pulsatingly dewatered in the first dewatering zone by drawing water from the fiber pulp traveling in between the wires of the first two-wire stretch through openings in the cap which extend through the cap, and affecting the dewatering of the fiber pulp traveling in-between the wires of the first two-wire stretch with an under-pressure affected through the openings of the cap in an area following after the leading edge.

42. (new) The method of claim 40, wherein the step of dewatering in the first dewatering zone of the first wire unit is accomplished as non-pulsating dewatering at the beginning of the two-wire stretch of the first wire unit by two successive fixed formation shoes, which are located on opposite sides of the two-wire stretch and which each have a curved cap provided with openings extending through the cap, and wherein under-pressure is affected through the each cap's openings, whereby fiber pulp traveling in-between the first formation wire and the first upper formation wire is subjected to non-pulsating dewatering by the two successive fixed formation shoes.

43. (new) The method of claim 40, wherein the step of dewatering in the second dewatering zone of the first wire unit is accomplished as pulsating dewatering by first fixed dewatering lists, which are placed against one side of the two-wire stretch in the cross machine direction, the first fixed dewatering lists defining gaps in between the lists wherein fiber pulp traveling in between the wires of the two-wire stretch is subjected to pulsating dewatering by the first fixed dewatering lists and by an under-pressure in the area of the first fixed dewatering lists.

44. (new) The method of claim 43, wherein the step of dewatering in the second dewatering zone of the first wire unit is accomplished as pulsating dewatering by the first fixed dewatering lists, and by controlled loading moveable lists which are located opposite the first fixed dewatering lists at the gaps between the first fixed dewatering lists.

45. (new) The method of claim 33 wherein the fixed first formation shoe cap defines a total surface area and wherein water is drawn through 50–90 percent of the total surface area of the cap.

46. (new) The method of claim 33 wherein the fixed first formation shoe draws water through the openings in the cap along an angle of 30–60 degrees between central axes of the openings and a tangent to the cap's outer surface obliquely against a traveling direction defined by the first formation wire.

47. (new) The method of claim 33 wherein the twin wire stretch moves about a radius of curvature of 1–5 m as the twin wire stretch moves over the fixed first formation shoe.

48. (new) The method of claim 33 wherein non-pulsating dewatering is performed by the fixed first formation shoe in such a way that an overlap angle of the formation wire traveling over the formation shoe is 3–45 degrees in an area defined by the cap.

49. (new) A multi-layer web formation section, comprising:

a first wire unit for forming a first partial web, having a first wire, the first wire unit having a forward end and an output end;

a first headbox arranged to supply a pulp suspension jet to the forward end of the first wire unit;

a second wire unit succeeding the first wire unit, the second wire unit having a two-wire stretch formed of the first wire and a second wire, the first wire and the second wire forming a closing jaw at a second forward end where the first wire and the second wire come together, and forming a second output end where the first wire and the second wire are separated from one another, and wherein a first partial web formed in the first wire unit is arranged to be guided on the first wire of the first wire unit to the two-wire stretch of the second wire unit;

a second headbox located at the second forward end of the two-wire stretch of the second wire unit and which is arranged to supply a new pulp layer in to the closing jaw;

a first dewatering zone formed by a fixed first formation shoe having a leading edge, and a curved cap positioned on one of the first wire and the second wire of the two-wire stretch of the second wire unit and located at the forward end of the two-wire stretch, the at least one fixed first formation shoe having the curved cap placed against the second wire of the two-wire stretch, the cap having portions defining openings which extend through the cap, which openings are connected to a source of under pressure, wherein the openings are formed by holes or by gaps extending essentially in the lengthwise direction of the machine, such that fiber pulp traveling in-between the formation wires of the two-wire stretch is subjected to non-pulsating dewatering in an area following after the leading edge of the first formation shoe; and

a second dewatering zone positioned after the first dewatering zone along the

two-wire stretch of the second wire unit and formed by fixed dewatering cross machine direction extending lists placed against one of the first wire and the second wire of the two-wire stretch of the second wire unit, the lists defining gaps between the lists, the gaps connected to a source of under pressure so that the fiber pulp traveling in between the first wire and the second wire is subjected to pulsating dewatering by the fixed dewatering lists and by under-pressure.

50. (new) The multi-layer web formation section of claim 49 wherein the second dewatering zone of the second wire unit also comprises loadable dewatering lists of the type which are structured so as to be loaded in a controlled manner, and which are located on an opposite side of the two-wire stretch in relation to the fixed dewatering lists at the gaps between the fixed dewatering lists.

51. (new) The multi-layer web formation section of claim 49 wherein the first wire unit is a fourdrinier wire unit, and the first headbox is arranged to supply the pulp suspension jet on to the first wire which is a fourdrinier wire.

52. (new) The multi-layer web formation section of claim 51, wherein the fourdrinier wire unit has two successive dewatering zones.

53. (new) The multi-layer web formation section of claim 52, wherein the first dewatering zone of the fourdrinier wire unit is formed by a fixed fourdrinier formation shoe which is located at the beginning of the first fourdrinier wire unit at a point where the pulp suspension jet is arranged to impact the fourdrinier wire, the fixed fourdrinier formation shoe having a curved cap placed against an inner surface of the fourdrinier wire and having portions defining openings extending through the cap, the openings connected to a source of under-pressure, so that the fixed fourdrinier formation shoe is arranged to subject a fiber pulp traveling on the fourdrinier wire to non-pulsating dewatering in an area following after a leading edge of the fixed fourdrinier formation shoe.

54. (new) The multi-layer web formation section of claim 53, wherein the second dewatering zone of the fourdrinier wire unit is formed by a second fixed fourdrinier formation shoe, which is located at the output end of the first fourdrinier wire unit at a point where the second headbox is arranged to impact a pulp suspension jet to form the new pulp layer, the second fixed fourdrinier formation shoe having a curved cap placed against an inner surface of the fourdrinier wire and having portions defining openings extending through the cap, the openings connected to a source of under-pressure, so that the second fixed fourdrinier formation shoe is arranged to subjected a fiber pulp traveling on the fourdrinier wire to non-pulsating dewatering in an area following after a leading edge of the second fixed fourdrinier formation shoe.

55. (new) The multi-layer web formation section of claim 49 wherein the first wire unit is a wire unit equipped with a superpostioned wire forming a first two-wire stretch with the first wire and forming a first jaw at the forward end of the first wire unit, the two-wire stretch defining a beginning where the first wire and the superpostioned wire first meet, and wherein the first headbox is arranged to supplies the pulp suspension jet into the first jaw.

56. (new) The multi-layer web formation section of claim 55 wherein there are two successive dewatering zones in the two-wire stretch of the first wire unit.

57. (new) The multi-layer web formation section of claim 56, wherein the first dewatering zone of the first wire unit is formed by a fixed second formation shoe, which is located at the beginning of the two-wire stretch of the first wire unit on one side of the two-wire stretch and which fixed second formation shoe has a curved cap placed against the one side of the two-wire stretch and the fixed second formation shoe has portions defining openings extending through the cap, the openings connected to a source of under-pressure, so that the fixed second formation shoe is arranged to subject fiber pulp traveling between the first forming wire and the superpostioned forming wire to non-pulsating dewatering in an area following after a leading edge of the fixed second formation shoe.

58. (new) The multi-layer web formation section of claim 56, wherein the first dewatering zone of the first wire unit is formed by two successive fixed second formation shoes, which are located at the beginning of the two-wire stretch of the first wire unit on opposite sides of the two-wire stretch and wherein each of the two successive fixed second formation shoes has a curved cap, and each of the two successive fixed second formation shoes has portions defining openings extending through the caps and connected to a source of under-pressure so that fiber pulp traveling in between the first formation wire and the superpostioned forming wire is subjected to non-pulsating dewatering in an area defined by the two successive fixed second formation shoes.

59. (new) The multi-layer web formation section of claim 56, wherein a second dewatering zone of the two succesive dewatering zones of the two-wire stretch of the first wire unit is formed by fixed dewatering lists, which are placed against one side of the two-wire stretch in the cross machine direction and which define gaps between the lists which are connected to a source of under-pressure so that the fiber pulp traveling in-between the formation wires of the two-wire stretch is subjected to pulsating dewatering by the fixed dewatering lists and by under-pressure in an area defined by the fixed dewatering lists.

60. (new) The multi-layer web formation section of claim 59 wherein the second dewatering zone of the first wire unit further comprises loadable dewatering lists, of the type which are structured so as to be loaded in a controlled manner, and which are located on the opposite side of the two-wire stretch in relation to the fixed dewatering lists at the gaps between the fixed dewatering lists.

61. (new) The multi-layer web formation section of claim 49, wherein a quantity of open surface area defined by the openings of the cap of the first formation shoe is 50–90 percent of a total surface area defined by the cap.

62. (new) The multi-layer web formation section of claim 49, wherein the holes extending through the cap of the first formation shoe are orientated obliquely against a traveling direction defined by the first formation wire, so that the holes form an angle of 30–60 degrees between central axes of the holes and a tangent to an outer surface defined by the cap.

63. (new) The multi-layer web formation section of claim 49, wherein the cap has a radius of curvature of 1–5 m.

64. (new) The multi-layer web formation section of claim 49 wherein the first formation wire has an overlap angle of 3–45 degrees with respect to an area defined by the cap of the first formation shoe.

65. (new) A method of forming a multi-layer web in a formation section, comprising the steps of:

forming a first partial web on a first wire of a first wire unit with a pulp suspension jet supplied by a first headbox at a forward end of the first wire unit;

guiding the first wire of the first forming unit and the first partial web formed thereon through a second wire unit, successive to the first wire unit, so that the first wire of the first wire unit meets a second wire of the second wire unit and defines a two-wire stretch with the second wire in the second wire unit, the two-wire stretch defining a forward end of the two wire stretch where the first wire meets the second wire, and a first side defined by the first wire and a second side defined by the second wire;

forming a second pulp layer atop the first partial web with a second pulp suspension jet supplied by a second headbox, at a forward end of the second wire unit;

subjecting the second pulp layer atop the first partial web to non-pulsating dewatering in at least a first dewatering zone of the two-wire stretch of the second wire unit, with a fixed formation shoe having a leading edge and a curved cap, which shoe is located at the forward end of the two-wire stretch, wherein the non-pulsating dewatering takes place by moving the twin wire stretch and the first partial web with the second pulp layer atop over the curved cap which is placed against the second side of two-wire stretch, wherein the first partial web with second pulp layer atop is subjected to non-pulsating dewatering in the first dewatering zone by drawing water from the first partial web with second pulp layer atop through openings in the cap formed by holes or by gaps essentially in the lengthwise direction of the machine which extend through the cap, and affecting the dewatering of the first partial web with the second pulp layer atop with an under-pressure through the openings of the cap in an area following after the leading edge of the fixed formation shoe;

subjecting the first partial web with second pulp layer atop to pulsating dewatering in

a second and downstream dewatering zone in the two-wire stretch of the second wire unit with fixed dewatering lists which are placed against the first side or the second side of the two-wire stretch, the fixed lists extending in the cross machine direction and between which there are gaps which extend in a cross machine direction, through which gaps under-pressure is drawn whereby the first partial web with the second pulp layer atop travelling in between the wires of the two-wire stretch is subjected to pulsating dewatering by the fixed dewatering lists, and by under-pressure in the gaps of the fixed dewatering lists;

wherein the step of subjecting the first partial web with second pulp layer atop to pulsating dewatering in the second and downstream dewatering zone includes controllably loading a plurality of moveable lists against the first side or the second side of the two-wire stretch, opposite the fixed dewatering lists, at the gaps between the fixed dewatering lists;

wherein in the step of forming the first partial web on the first wire with the pulp suspension jet is comprises supplying the suspension jet in to a jaw at a forward end of the first wire unit, the jaw being defined by the first wire and a superpostioned wire forming a first two-wire stretch, the first two wire stretch defining a beginning where the first wire and the superpostioned wire first meet;

accomplishing dewatering in a first dewatering zone of the first wire unit as non-pulsating dewatering with another fixed formation shoe having a leading edge and a curved cap, which shoe is located at the beginning of the first two-wire stretch, wherein the non-pulsating dewatering takes place by moving the first two-wire stretch over the curved cap which is placed against one side of the first two-wire stretch, wherein fiber pulp traveling in-between the formation wires is non-pulsatingly dewatered in the first dewatering zone by drawing water from the fiber pulp traveling in-between the formation wires

through openings in the cap which extend through the cap, and affecting the dewatering of fiber pulp traveling in-between the formation wires with an under-pressure effected through the openings of the cap in an area following after the leading edge; and

accomplishing dewatering in a second dewatering zone of the first wire unit as pulsating dewatering with fixed dewatering lists, located on one side of the first two-wire stretch downstream of the first dewatering zone of the first wire unit and dewatering with controlled loading moveable lists which are located on a side of the first two-wire stretch which is opposite the fixed dewatering lists, the controlled loading moveable lists positioned at the gaps between the fixed dewatering lists.